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Lake County
Florida

National Eutrophication Survey, Corvallis, Oreg

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NATIONAL EUTROPHICATION SURVEY

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REPORT
ON
LAKE DORA
LAKE COUNTY
FLORIDA
EPA REGION IV
WORKING PAPER No. 248

WITH THE COOPERATION OF THE
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
AND THE
FLORIDA NATIONAL GUARD
OCTOBER, 1977

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

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Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Florida Department of Environmental Regulation for professional involvement and to the Florida National Guard for conducting the tributary sampling phase of the Survey.

Joseph W. Landers, Jr., Secretary of the Department of Environmental Regulation; John A Redmond, former Director of the Division of Planning, Technical Assistance, and Grants; and Dr. Tim S. Stuart, Chief of the Bureau of Water Quality, provided invaluable lake documentation and counsel during the survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

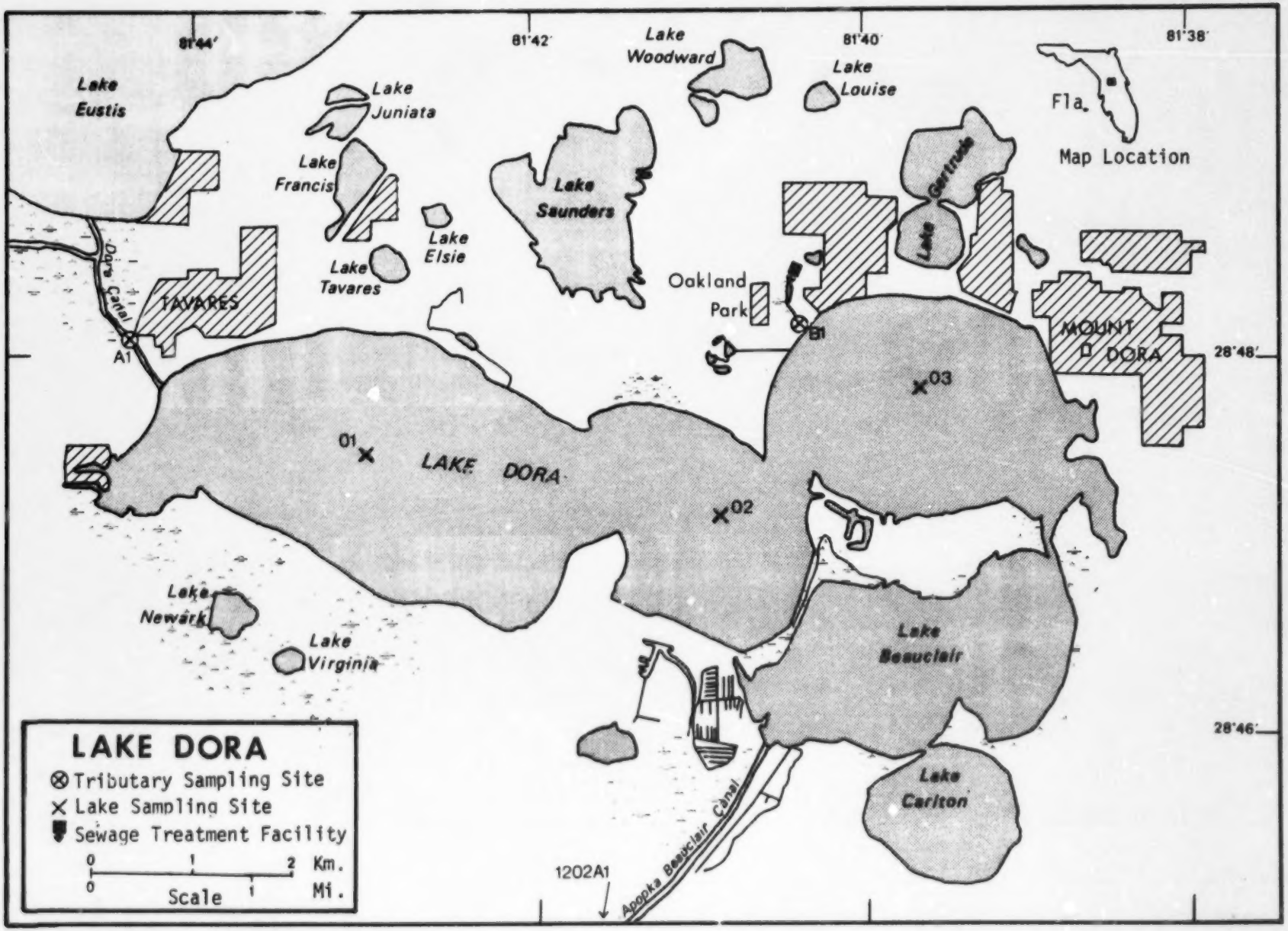
Major General Henry W. McMillan (Retired), then the Adjutant General of Florida, and Project Officer Colonel Hugo F. Windham, who directed the volunteer efforts of the Florida National Guard, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF FLORIDA

LAKE NAME	COUNTY
Alligator	Columbia
Apopka	Lake, Orange
Banana	Polk
Crescent	Flagler, Putnam
Doctors	Clay
Dora	Lake
East Tohopekaliga	Osceola
Effie	Polk
Eloise	Polk
George	Putnam, Volusia
Gibson	Polk
Glenada	Highlands
Griffin	Lake
Haines	Polk
Hancock	Polk
Horseshoe	Seminole
Howell	Orange, Seminole
Istokpoga	Highlands
Jessie	Polk
Jessup	Seminole
Kissimmee	Osceola
Lawne	Orange
Lulu	Polk
Marion	Polk
Minnehaha	Orange
Minneola	Lake
Monroe	Seminole, Volusia
Munson	Leon
Okeechobee	Glades, Hendry, Martin, Okeechobee, Palm Beach
Poinsett	Brevard, Orange, Osceola
Reedy	Polk
Seminole	Jackson, FL; Decatur, Seminole, GA
Seminole	Pinellas
South	Brevard
Talquin	Gadsden, Leon
Tarpon	Pinellas
Thonotosassa	Hillsborough
Tohopekaliga	Osceola
Trout	Lake
Weohyakapka	Polk
Yale	Lake


81°44'
81°42'
81°40'
81°38'
28°48'
28°46'
Lake Eustis
Lake Juniata
Lake Woodward
Lake Louise
Fla.
Map Location
Lake Francis
Lake Saunders
Lake Gertrude
Lake Elsie
Lake Tavares
Dora Canal
TAVARES
Oakland Park
B1
A1
MOUNT DORA
03
01
LAKE DORA
02
Lake Newark
Lake Virginia
Lake Beauclair
Lake Carlton
Apopka Beauclair Canal
1202A1
LAKE DORA
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 1 2 Km.
0 1 Mi.
Scale

LAKE DORA

STORET NO. 1208

I. CONCLUSIONS

A. Trophic Condition:

Survey data and a report by others (Shannon and Brezonik, 1972) indicate that Lake Dora is hypereutrophic. Based on a comparison of six water quality parameters, this lake ranked twentieth in overall trophic quality among the 41 Florida lakes sampled in 1973*. Nineteen of the lakes had less and one had the same median total phosphorus, 13 had less median dissolved phosphorus, 25 had less median inorganic nitrogen, 18 had less mean chlorophyll a, and 33 had greater mean Secchi disc transparency. Depression of dissolved oxygen was not evident at any of the Survey sampling times; however, it is reported that Lake Dora has had summer fish kills (Ketelle and Uttormark, 1971).

High numbers of blue-green algae (page 7), chlorophyll a concentrations of up to 100 µg/l, and Secchi disc transparencies of 0.5 meter or less indicate the enriched condition of the lake.

B. Rate-Limiting Nutrient:

There was a significant loss of inorganic nitrogen in the sample, and the algal assay results are not representative of conditions in the lake at the time the sample was collected (03/12/73).

The lake data indicate phosphorus limitation in March and nitrogen limitation in September and November.

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* See Appendix A.

C. Nutrient Controllability:

1. Point sources--During the sampling year, Lake Dora received an estimated total phosphorus loading of 1.83 g/m^2, or more than four times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading. However, over 87% of the estimated load is attributed to the Apopka-Beauclair Canal, but because of expected but unquantified phosphorus retention in intervening Lake Beauclair (see map, page v), the phosphorus contribution of the Canal must have been less than indicated. Therefore, the overall Lake Dora phosphorus loading also must have been less than shown above (e. g., if 40% phosphorus entrapment had occurred in Lake Beauclair, the Lake Dora loading would have been 1.19 g/m^2/yr or 2.7 times the eutrophic level).

It is estimated that 5.5% of the total phosphorus load was contributed by the Mount Dora wastewater treatment plant during the sampling year. Phosphorus removal or effluent diversion at this source probably would not result in an appreciable improvement in the trophic condition of the lake unless phosphorus can be controlled elsewhere in the drainage.

The municipal, industrial, and agricultural sources in the upstream Lake Apopka* drainage contributed an estimated 60,990 kg of phosphorus to that lake during the sampling year. Allowing for retention in Lake Apopka (54.4%), it is calculated the above sources

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Working Paper No. 244.

contributed 67.8% of the 35,925 kg phosphorus load measured at the Apopka-Beauclair Canal outlet station (1202 A-1); i.e., 27,810 kg. Because of the uncertainty as to the degree of phosphorus retention in Lake Beauclair noted above, the impact of the indirect phosphorus sources cannot be quantified; however, again assuming 40% retention in Lake Beauclair, those sources could have contributed nearly 17,000 kg of phosphorus to Lake Dora and thus could have been significant sources.

Although a critical assessment of the effects of phosphorus control on the trophic condition of Lake Dora is dependent on a determination of phosphorus retention in Lake Beauclair, it seems likely that a high degree of phosphorus removal at all of the sources in the drainage would result in an appreciable improvement, particularly since Florida lakes may be able to assimilate phosphorus at a higher level than that suggested by Vollenweider (see page 13).

2. Non-point sources--With municipal, industrial, and agricultural nutrient loads subtracted, the phosphorus and nitrogen exports of the Apopka-Beauclair Canal were 17 and 465 kg/km^2, respectively, during the sampling year (page 13). These rates are comparable to the means of the rates of two tributaries of nearby Lake Griffin* (16 kg P and 412 kg N/km^2/yr).

** Working Paper No. 254.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 22.37 kilometers^2.
2. Mean depth: 3.0 meters.
3. Maximum depth: 4.9 meters.
4. Volume: 67.110 x 10^6 m^3.
5. Mean hydraulic retention time: 221 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Unnamed Creek B-1	1.1	0.03
Apopka-Beauclair Canal	476.6	2.73
Minor tributaries & immediate drainage -	113.7	0.75
Totals	591.4	3.51**

2. Outlet -

Dora Canal	613.8***	3.51

C. Precipitation****:

1. Year of sampling: 126.3 centimeters.
2. Mean annual: 137.3 centimeters.

† Table of metric conversions--Appendix B.
†† Brezonik and Shannon, 1971.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Sum of inflows adjusted to equal outflow.
*** Includes area of lake
**** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake Dora was sampled three times during 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from one or more depths at each station (see map, page v). During each visit, a single depth-integrated (near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 1.8 meters at station 1, 2.4 meters at station 2, and 2.7 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE DORA
STORET CODE 1208

PARAMETER	1ST SAMPLING (3/12/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (9/ 6/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/ 5/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	23.5 - 25.8	24.4	24.3	28.3 - 29.8	29.0	29.1	22.6 - 23.3	23.0	23.0
DISS OXY (MG/L)	10.0 - 11.1	10.6	10.6	7.6 - 10.2	9.2	9.5	9.6 - 11.2	10.5	10.5
CNDCTVY (MCROMO)	300. - 325.	314.	315.	357. - 960.	511.	363.	310. - 323.	315.	311.
PH (STAND UNITS)	9.6 - 9.7	9.7	9.7	8.8 - 9.1	9.0	9.0	9.2 - 9.4	9.3	9.3
TOT ALK (MG/L)	105. - 115.	109.	110.	99. - 102.	100.	100.	103. - 108.	106.	105.
TOT P (MG/L)	0.085 - 0.138	0.109	0.102	0.065 - 0.118	0.093	0.094	0.072 - 0.117	0.097	0.102
ORTHO P (MG/L)	0.011 - 0.018	0.014	0.013	0.020 - 0.034	0.025	0.024	0.030 - 0.076	0.045	0.038
NO2+NO3 (MG/L)	0.140 - 0.200	0.170	0.175	0.100 - 0.140	0.122	0.125	0.090 - 0.170	0.126	0.130
AMMONIA (MG/L)	0.100 - 0.150	0.127	0.135	0.080 - 0.120	0.095	0.090	0.090 - 0.180	0.118	0.110
KJEL N (MG/L)	2.500 - 3.000	2.650	2.550	2.500 - 4.400	3.800	4.150	3.200 - 3.900	3.567	3.650
INORG N (MG/L)	0.240 - 0.350	0.297	0.310	0.180 - 0.260	0.217	0.215	0.180 - 0.350	0.244	0.230
TOTAL N (MG/L)	2.640 - 3.190	2.820	2.715	2.630 - 4.540	3.922	4.260	3.290 - 4.010	3.706	3.930
CHLRPYL A (UG/L)	36.7 - 66.5	49.3	44.8	69.0 - 99.8	80.2	71.8	31.3 - 63.9	50.4	56.0
SECCHI (METERS)	0.4 - 0.6	0.5	0.4	0.3 - 0.5	0.4	0.4	0.4 - 0.5	0.4	0.5

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/12/73	1. Lyngbya sp.	17,816
	2. Microcystis sp.	3,857
	3. Aphanocapsa sp.	3,061
	4. Merismopedia sp.	2,939
	5. Scenedesmus sp.	979
	Other genera	8,939
	Total	37,591
09/06/73	1. Lyngbya sp.	42,201
	2. Aphanocapsa sp.	3,389
	3. Microcystis sp.	3,081
	4. Chroococcus sp.	2,464
	5. Melosira sp.	2,310
	Other genera	7,700
	Total	61,145
11/05/73	1. Lyngbya sp.	64,102
	2. Microcystis sp.	13,090
	3. Chroococcus sp.	6,352
	4. Merismopedia sp.	5,005
	5. Anabaena sp.	1,732
	Other genera	10,391
	Total	100,672

Sampling Date	Station Number	Chlorophyll a (µg/l)
03/12/73	1	36.7
	2	44.8
	3	66.5
09/06/73	1	69.0
	2	71.8
	3	99.8
11/05/73	1	31.3
	2	63.9
	3	56.0

C. Limiting Nutrient Study:

There was a 60% loss of inorganic nitrogen in the sample between the time of collection and the beginning of the algal assay, and the results are not representative of conditions in the lake at the time the sample was taken (03/12/73).

The lake data indicate phosphorus limitation in March at all stations but nitrogen limitation at all stations in September and November.

Following is a tabulation of the mean inorganic nitrogen/orthophosphorus ratios for each of the stations and sampling times with the indicated limiting nutrient in parentheses.

Station	03/12/73	09/06/73	11/05/73
1	22/1 (P)	11/1 (N)	6/1 (N)
2	21/1 (P)	8/1 (N)	5/1 (N)
3	20/1 (P)	7/1 (N)	5/1 (N)

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Florida National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v). Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Florida District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

The flows given for site 1202A-1 (Lake Apopka outlet) were added to the Lake Dora B-1 and ZZ flows to determine the total inflow to the lake (Anderson, 1974). Also, nutrient loads at the Lake Apopka outlet station are reported as inlet loads to Lake Dora.

Nutrient loads for station B-1 and the unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/yr$, at stations A-1 and B-1 of nearby Lake Griffin** and multiplying the means by the ZZ area in km^2.

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* See Working Paper No. 175.
** Working Paper No. 254.

The operator of the Mount Dora wastewater treatment plant provided only two effluent samples; therefore, nutrient loads were estimated at 1.134 kg P and 3.401 kg N/capita/year, and the mean flow was estimated at 0.3785 m^3/capita/day.

A. Waste Sources:

1. Known municipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Mount Dora	2,000*	trickling filter	757.0	Unnamed Creek B-1

2. Known industrial - None

* Treatment plant questionnaire.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Unnamed Creek B-1	20	<0.1
Apopka-Beauclair Canal	35,925	87.6
b. Minor tributaries & immediate drainage (non-point load) -	1,760	4.3
c. Known municipal STP's -		
Mount Dora	2,270	5.5
d. Indirect municipal -	?	-
e. Septic tanks* -	55	0.1
f. Indirect industrial & agricultural	?	-
g. Direct precipitation** -	985	2.4
Total	41,015	100.0

2. Outputs -

Lake outlet - Dora Canal 12,450

3. Net annual P accumulation - 28,565 kg.

* Estimate based on 202 lakeshore dwellings; see Working Paper No. 175.
** Brezonik and Shannon, 1971.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Unnamed Creek B-1	445	0.1
Apopka-Beauclair Canal	354,670	83.7
b. Minor tributaries & immediate drainage (non-point load) -	46,845	11.0
c. Known municipal STP's -		
Mount Dora	6,800	1.6
d. Indirect municipal -	?	-
e. Septic tanks* -	2,155	0.5
f. Indirect industrial & agricultural	?	-
g. Direct precipitation** -	12,975	3.1
Total	423,890	100.0

2. Outputs -

Lake outlet - Dora Canal 312,365

3. Net annual N accumulation - 111,525 kg.

* Estimate based on 202 lakeshore dwellings; see Working Paper No. 175.
** Brezonik and Shannon, 1971.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Apopka-Beauclair Canal*	17	465

E. Yearly Loading Rates:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Note, however, that Florida lakes may be able to assimilate phosphorus at a somewhat higher level than that suggested by Vollenweider (Shannon and Brezonik, 1972).

Essentially, Vollenweider's "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	1.83	1.28	18.9	5.0

Vollenweider phosphorus loadings (g/m²/yr) based on mean depth and mean hydraulic retention time of Lake Dora:	
"Dangerous" (eutrophic loading)	0.44
"Permissible" (oligotrophic loading)	0.22

* Municipal, industrial, and agricultural loads subtracted.

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1201	ALLIGATOR LAKE	0.620	0.260	474.000	87.733	13.100	0.386
1202	LAKE APOPKA	0.102	0.230	484.176	46.611	8.200	0.019
1203	LAKE BANANA	0.660	0.260	482.667	208.600	3.600	0.293
1206	LAKE CRESCENT	0.065	0.130	473.889	10.211	10.200	0.033
1207	DOCTORS LAKE	0.084	0.120	465.555	27.100	10.600	0.028
1208	LAKE DORA	0.102	0.240	482.889	59.978	7.400	0.022
1209	LAKE EFFIE	1.480	0.419	489.000	261.433	15.000	0.950
1210	LAKE GEORGE	0.129	0.165	469.308	35.000	11.000	0.063
1211	LAKE GIBSON	0.167	0.115	470.000	19.675	10.200	0.069
1212	GLENADA LAKE	0.134	0.165	454.167	27.667	14.700	0.072
1214	LAKE GRIFFIN	0.119	0.260	481.333	66.855	6.600	0.038
1215	LAKE HAINES	0.063	0.115	462.667	26.567	10.600	0.014
1217	LAKE HANCOCK	0.772	0.195	483.500	97.900	5.600	0.158
1219	LAKE HORSESHOE	0.034	0.130	459.000	12.067	11.500	0.023
1220	LAKE HOWELL	1.240	0.285	464.000	54.117	9.000	1.175
1221	LAKE ISTOKPOGA	0.039	0.120	464.222	6.594	8.600	0.010
1223	LAKE JESSUP	0.492	0.290	487.000	76.550	7.600	0.288
1224	LAKE KISSIMMEE	0.034	0.145	463.667	24.142	8.800	0.007
1227	LAKE LULU	1.490	1.065	483.000	276.566	14.300	1.030
1228	LAKE MARION	0.044	0.260	468.833	29.967	7.600	0.016
1229	LAKE MINNEHAHA	0.038	0.380	435.000	8.733	7.700	0.012
1230	LAKE MINNEOLA	0.018	0.070	406.333	3.333	7.400	0.009
1231	LAKE MONROE	0.188	0.300	474.555	14.225	10.800	0.128
1232	LAKE OKEECHOBEE	0.063	0.185	472.366	14.524	9.800	0.010
1234	LAKE POINSETT	0.085	0.150	469.000	6.500	10.600	0.051
1236	LAKE REEDY	0.033	0.330	468.500	34.837	10.600	0.008
1238	LAKE SOUTH	0.074	0.130	454.000	23.167	9.000	0.028
1239	LAKE TALQUIN	0.085	0.290	462.167	9.483	14.400	0.031

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLOPA	IS-MIN DO	MEDIAN DISS ORTHO P
1240	LAKE THONOTOSASSA	0.695	0.895	466.167	37.700	10.200	0.565
1241	LAKE TOHOPEKALIGA	0.246	0.200	472.917	30.633	10.500	0.152
1242	TROUT LAKE	1.110	0.650	472.000	76.967	12.900	0.970
1243	LAKE NEOHYAKAPKA	0.047	0.080	458.667	7.767	8.200	0.011
1246	LAKE YALE	0.027	0.160	441.000	25.367	7.600	0.014
1247	LAKE MUNSON	1.475	0.925	486.667	140.317	12.200	0.852
1248	LAKE SEMINOLE	0.234	0.175	473.833	102.000	8.600	0.026
1249	LAKE LAWNE	2.560	1.350	494.667	84.900	10.400	0.117
1250	LAKE TARPON	0.041	0.070	480.889	6.867	9.000	0.027
1252	LAKE ELOISE	0.486	0.170	465.333	70.233	12.200	0.339
1256	LAKE JESSIE	0.051	0.090	452.667	26.300	10.800	0.011
1261	EAST LAKE TOHOPEKALIGA	0.042	0.070	440.833	5.167	9.400	0.007
1264	PAYNE'S PRAIRIE LAKE (NO	1.260	0.140	476.000	88.200	7.400	1.210

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1201	ALLIGATOR LAKE	25 (10)	29 (10)	30 (12)	18 (7)	10 (4)	18 (7)	130
1202	LAKE APOPKA	50 (20)	38 (15)	10 (4)	38 (15)	74 (29)	70 (28)	280
1203	LAKE BANANA	23 (9)	29 (10)	20 (8)	5 (2)	100 (40)	23 (9)	200
1206	LAKE CRESCENT	65 (26)	70 (27)	33 (13)	80 (32)	48 (18)	50 (20)	346
1207	DOCTORS LAKE	60 (24)	76 (30)	60 (24)	55 (22)	34 (12)	56 (22)	341
1208	LAKE DORA	53 (21)	35 (14)	18 (7)	33 (13)	90 (35)	68 (27)	247
1209	LAKE EFFIE	5 (2)	10 (4)	3 (1)	3 (1)	0 (0)	10 (4)	31
1210	LAKE GEORGE	45 (18)	54 (21)	48 (19)	43 (17)	23 (9)	43 (17)	256
1211	LAKE GIBSON	40 (16)	81 (32)	45 (18)	70 (28)	48 (18)	40 (16)	324
1212	GLENADA LAKE	43 (17)	54 (21)	85 (34)	53 (21)	3 (1)	38 (15)	276
1214	LAKE GRIFFIN	48 (19)	29 (10)	23 (9)	30 (12)	95 (38)	48 (19)	273
1215	LAKE HAINES	70 (28)	81 (32)	75 (30)	58 (23)	34 (12)	78 (31)	396
1217	LAKE HANCOCK	18 (7)	43 (17)	13 (5)	13 (5)	98 (39)	28 (11)	213
1219	LAKE HORSESHOE	93 (37)	70 (27)	80 (32)	78 (31)	20 (8)	65 (26)	406
1220	LAKE HOWELL	11 (4)	23 (9)	69 (27)	35 (14)	60 (23)	3 (1)	201
1221	LAKE ISTOKPOGA	89 (34)	76 (30)	65 (26)	93 (37)	69 (27)	89 (35)	477
1223	LAKE JESSUP	28 (11)	18 (7)	5 (2)	25 (10)	83 (32)	25 (10)	184
1224	LAKE KISSIMMEE	90 (36)	63 (25)	73 (29)	65 (26)	65 (26)	99 (39)	455
1227	LAKE LULU	3 (1)	3 (1)	15 (6)	0 (0)	8 (3)	5 (2)	34
1228	LAKE MARION	78 (31)	29 (10)	53 (21)	50 (20)	83 (32)	73 (29)	366
1229	LAKE MINNEHAHA	88 (35)	91 (36)	95 (38)	85 (34)	78 (31)	80 (32)	517
1230	LAKE MINNEOLA	100 (40)	98 (38)	98 (39)	100 (40)	90 (35)	93 (37)	579
1231	LAKE MONROE	38 (15)	15 (6)	28 (11)	75 (30)	26 (10)	33 (13)	215
1232	LAKE OKEECHOBEE	68 (27)	45 (18)	40 (16)	73 (29)	53 (21)	89 (35)	368
1234	LAKE POINSETT	58 (23)	60 (24)	50 (20)	95 (38)	34 (12)	45 (18)	342
1236	LAKE REEDY	95 (38)	13 (5)	55 (22)	45 (18)	34 (12)	95 (38)	337
1238	LAKE SOUTH	63 (25)	70 (27)	69 (27)	68 (27)	60 (23)	56 (22)	386
1239	LAKE TALQUIN	55 (22)	20 (8)	78 (31)	83 (33)	5 (2)	53 (21)	294

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1240	LAKE THONOTOSASSA	20 (8)	85 (34)	58 (23)	40 (16)	48 (18)	15 (6)	266
1241	LAKE TOHOPEKALIGA	33 (13)	40 (16)	38 (15)	48 (19)	40 (16)	30 (12)	229
1242	TROUT LAKE	15 (6)	8 (3)	43 (17)	23 (9)	13 (5)	8 (3)	110
1243	LAKE WEOHYAKAPKA	75 (30)	91 (36)	83 (33)	88 (35)	74 (29)	84 (33)	495
1246	LAKE YALE	98 (39)	58 (23)	90 (36)	63 (25)	83 (32)	75 (30)	467
1247	LAKE MUNSON	8 (3)	5 (2)	8 (3)	8 (3)	16 (6)	13 (5)	58
1248	LAKE SEMINOLE	35 (14)	48 (19)	35 (14)	10 (4)	69 (27)	63 (25)	260
1249	LAKE LAWNE	0 (0)	0 (0)	0 (0)	20 (8)	43 (17)	35 (14)	98
1250	LAKE TARPON	83 (33)	98 (38)	100 (40)	90 (36)	60 (23)	60 (24)	491
1252	LAKE ELOISE	30 (12)	50 (20)	63 (25)	28 (11)	16 (6)	20 (8)	207
1258	LAKE JESSIE	73 (29)	88 (35)	88 (35)	60 (24)	26 (10)	84 (33)	419
1261	EAST LAKE TOHOPEKALIGA	80 (32)	98 (38)	93 (37)	98 (39)	55 (22)	99 (39)	523
1264	PAYNE'S PRAIRIE LAKE (NO	11 (4)	65 (26)	25 (10)	15 (6)	90 (35)	0 (0)	206

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1230	LAKE MINNEOLA	579
2	1261	EAST LAKE TOHOPEKALIGA	523
3	1229	LAKE MINNEHAHA	517
4	1243	LAKE WEOHYAKAPKA	495
5	1250	LAKE TARPON	491
6	1221	LAKE ISTOKPOGA	477
7	1246	LAKE YALE	467
8	1224	LAKE KISSIMMEE	455
9	1258	LAKE JESSIE	419
10	1219	LAKE HORSESHOE	406
11	1215	LAKE HAINES	396
12	1238	LAKE SOUTH	386
13	1232	LAKE OKEECHOBEE	368
14	1228	LAKE MARION	366
15	1206	LAKE CRESCENT	346
16	1234	LAKE POINSETT	342
17	1207	DOCTORS LAKE	341
18	1236	LAKE REEDY	337
19	1211	LAKE GIBSON	324
20	1208	LAKE DORA	297
21	1239	LAKE TALQUIN	294
22	1202	LAKE APOPKA	280
23	1212	GLENADA LAKE	276
24	1214	LAKE GRIFFIN	273
25	1240	LAKE THONOTOSASSA	266
26	1248	LAKE SEMINOLE	260
27	1210	LAKE GEORGE	256
28	1241	LAKE TOHOPEKALIGA	229

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1231	LAKE MONROE	215
30	1217	LAKE HANCOCK	213
31	1252	LAKE ELOISE	207
32	1264	PAYNE'S PRAIRIE LAKE (NO	206
33	1220	LAKE HOWELL	201
34	1203	LAKE BANANA	200
35	1223	LAKE JESSUP	184
36	1201	ALLIGATOR LAKE	130
37	1242	TROUT LAKE	110
38	1249	LAKE LAWNE	98
39	1247	LAKE HUNSON	58
40	1227	LAKE LULU	34
41	1209	LAKE EFFIE	31

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR FLORIDA 8/25/75

LAKE CODE 1208 DORA LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 613.8

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1208A1	613.8	3.37	3.65	4.70	4.76	2.32	2.63	2.89	4.47	5.47	3.37	2.55	1.95	3.51
1208B1	1.1	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.03	0.04	0.03	0.02	0.02	0.03
1208ZZ	118.2	0.31	0.40	0.65	0.45	0.11	0.11	0.34	0.59	0.85	0.65	0.40	0.25	0.43

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 613.8
SUM OF SUB-DRAINAGE AREAS = 119.3

TOTAL FLOW IN = 5.43
TOTAL FLOW OUT = 42.14

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1208A1	3	73	3.11	17	2.01				
	4	73	1.19	8	3.88				
	5	73	0.85	20	-0.54				
	6	73	0.40	18	-1.16				
	7	73	1.36						
	8	73	1.53						
	9	73	1.22	15	2.92				
	10	73	2.97						
	11	73	2.38	4	4.05				
	12	73	0.93	9	-0.51				
	1	74	0.34	6	0.28				
	2	74	0.79	3	-1.13				
1208B1	3	73	0.02	17	0.02				
	4	73	0.02	8	0.03				
	5	73	0.01	20	0.01				
	6	73	0.02	18	0.01				
	7	73	0.02						
	8	73	0.02						
	9	73	0.03	15	0.02				
	10	73	0.02						
	11	73	0.01	4	0.01				
	12	73	0.01	9	0.01				
	1	74	0.02	6	0.02				
	2	74	0.01	3	0.01				
1208ZZ	3	73	0.25	17	0.18				
	4	73	0.34	8	0.59				
	5	73	0.02	20	0.01				
	6	73	0.08	18	0.01				
	7	73	0.07						
	8	73	0.22						
	9	73	0.37	15	0.28				
	10	73	0.28						
	11	73	0.05	4	0.06				
	12	73	0.10	9	0.04				
	1	74	0.12	6	0.18				
	2	74	0.03	3	0.04				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/08/25

120801
28 47 20.0 081 42 45.0
LAKE DORA
12069 FLORIDA

11EPALES 2111202
3 0010 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	15 50	0000	25.8		25	310	9.70	105	0.100	2.500	0.140	0.011
	15 50	0006	24.6	10.6		300	9.60	105	0.140	2.500	0.190	0.014
73/09/06	14 45	0000	29.8	9.8	12	357	9.10	99	0.090	2.500	0.130	0.020
73/11/05	16 20	0000	23.3		18	310	9.20	103	0.090	3.200	0.090	0.030
	16 20	0001	23.3	10.4		310						
	16 20	0006	23.2	10.6		311	9.30	104	0.110	3.200	0.130	0.038

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	15 50	0000	0.138	36.7
	15 50	0006	0.085	
73/09/06	14 45	0000	0.065	69.0
73/11/05	16 20	0000	0.072	31.3
	16 20	0006	0.078	

STORET RETRIEVAL DATE 75/08/25

120802
28 47 05.0 081 40 53.0
LAKE DORA
12069 FLORIDA

11EPALES 2111202
3 0009 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	16 20	0000	24.0		15	320	9.70	109	0.130	2.500	0.160	0.012
	16 20	0006	23.5	11.1		320	9.70	112	0.150	2.800	0.200	0.018
73/09/06	14 55	0000	29.2	9.2	18	358	9.00	100	0.090	3.900	0.120	0.022
	14 55	0008	28.3	7.6		515	8.80	99	0.120	4.400	0.140	0.034
73/11/05	16 32	0000	22.6		18	311	9.30	108	0.110	3.900	0.110	0.038
	16 32	0001	22.6	9.8		311						
	16 32	0005	22.6	9.6		311	9.30	108	0.180	3.800	0.170	0.076

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	16 20	0000	0.093	44.8
	16 20	0006	0.100	
73/09/06	14 55	0000	0.074	71.8
	14 55	0008	0.118	
73/11/05	16 32	0000	0.099	63.9
	16 32	0005	0.108	

STORET RETRIEVAL DATE 75/09/25

120803
28 47 45.0 081 39 37.0
LAKE DORA
12069 FLORIDA

11EPALES 2111202
3 0010 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	16	55 0000	25.0		15	325	9.70	110	0.100	2.600	0.140	0.011
	16	55 0006	23.6	10.0		310	9.60	115	0.140	3.000	0.190	0.016
73/09/06	15	10 0000	29.1	10.2	16	363	9.10	102	0.080	4.400	0.100	0.026
	15	10 0009	28.4			960						
73/11/05	16	42 0000	23.0		17	323	9.40			3.500		
	16	42 0001	23.0	11.2		323						
	16	42 0006	23.0	11.2		323	9.40	105	0.100	3.800	0.130	0.045

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	16	55 0000	0.104	66.5
	16	55 0006	0.137	
73/09/06	15	10 0000	0.115	99.8
73/11/05	16	42 0000	0.106	56.0
	16	42 0006	0.117	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/05/25

1208A1
28 48 00.0 081 44 30.0
DORA CANAL
12019 7.5 EUSTIS
T/DORA LAKE
DUNCAN DR BRDG W OF TAVARES
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/17	11 43		0.010K	2.900	0.019	0.022	0.130
73/04/08	11 10		0.010K	3.200	0.042	0.022	0.135
73/05/20	10 10		0.016	2.310	0.060	0.030	0.150
73/06/18	11 00		0.010K	3.580	0.050	0.020	0.080
73/09/15	08 30		0.010K	2.720	0.015	0.021	0.085
73/11/04	13 45		0.016	1.750	0.840	0.012	0.080

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/08/25

120881
28 48 00.0 081 40 30.0
UNNAMED CREEK
12 7.5 EUSTIS
T/DORA LAKE
ST HWY 452 DRDG BELO OAKLAND PARK STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/17	11	21	0.013	7.800	4.800	0.069	0.390
73/04/08	11	00	0.058	3.400	1.500	0.220	0.480
73/05/20	09	25	0.084	6.300	3.000	0.132	0.560
73/06/18	11	15	0.017	19.900	6.720	0.170	3.400
73/09/15	08	15	0.015		4.150	0.550	1.350
73/12/04	10	20	0.012	4.600	3.700	0.176	0.470
74/01/06	10	40	0.052	9.500	5.600	0.184	3.500
74/02/03	13	45	0.048	11.000	7.200	0.120	0.990

32

STORET RETRIEVAL DATE 75/08/25

12088A TF1208800
28 48 30.0 081 40 30.0
MOUNT DORA
12019 7.5 EUSTIS
D/LAKE DORA
LAKE DORA
11EPALES 2141
4 0000 M

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/02	11 00								
CP(T)-			0.681	5.810	2.000	0.232	0.620	0.297	0.323
73/05/02	16 00								
73/11/21	15 00		0.340	12.500	9.500	0.110	0.550	0.450	0.412